Closed biopsy may be useful to diagnose suspected metastases to bone, but histologic diagnosis of primary tumors can be difficult, requiring larger tissue specimens for multiple studies including special stains, immunoperoxidase studies and electron-microscopic evaluation. Frozen section confirmation that representative tissue has been obtained is always advisable. Alignment of biopsy incisions is crucial because the scar must later be resected en bloc with the tumor. Incisions should be vertical on the extremities and transverse only at the pelvic rim and joint flexion creases. Poorly placed incisions can prevent any attempt at preserving a limb and can force amputation. It is suggested that a preliminary biopsy be done only by a physician who is fully qualified to carry out the definitive surgical procedure. Arthroscopic biopsy in the evaluation of joint symptoms due to an adjacent tumor is contraindicated. Transsynovial biopsy of a tumor will seed the entire joint with cells, creating an exceptionally difficult surgical problem.

For a number of reasons, only a peripheral wedge of tumor should be excised to show its type and highest cellular grade. Peripheral tissue is often less mineralized and easier to cut for frozen section. Bleeding is easier to control after a peripheral biopsy than a larger, deeper incision, and further weakening of the bone is avoided. Management of the biopsy site should include rigorous hemostasis and wound suction to help prevent dissemination of tumor cells along adjacent fascial planes. Suction tube(s) are brought out in line with the incision to facilitate later en bloc resection.

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Alternatives to Cemented Joint Prostheses

ALTHOUGH THE CEMENTED total hip replacement has outperformed all other reconstructive procedures for the arthritic hip, ten-year follow-up studies have shown a loosening rate at the bone-cement junction approximating 25%. Additionally, osteolysis, in some part due to the fragmentation of cement and the body's response to this particulate debris, may make further reconstruction difficult. The cementless total hip replacement has been developed to overcome this long-term loosening and osteolysis.

Cementless technology has developed along two conceptual lines. The Europeans have concentrated their efforts on macrointerlock of bone to prosthesis, while North Americans have concentrated on microinterlock of bone to prosthesis. Macrointerlock prostheses, because of their mechanical weakness, relatively high loosening rate and difficulty in removal due to bony ingrowth, have few proponents in this country.

The microinterlock prosthesis is now used rather extensively in this country, especially in the treatment of arthritic problems in younger patients. In the microinterlock system, the prosthesis is coated with beads or wires, creating 200 to 500 micron surface pores on the prosthetic surface for bony ingrowth. Several problems inherent in this technique must be recognized. The process of attaching the porous material to the prosthesis significantly weakens its structure and may cause it to break in the long term. The percentage of pores that actually are ingrown with bone varies substantially in studies, but it appears that only about 30% of the material is actually ingrown with bone. Thus, the question remains whether these devices will actually biologically bond with the femur and the acetabulum. Other problems include low-grade pain and limp, technical difficulty in implanting the prosthesis and stress shielding or resorption of unstressed bone. Despite these cautions, excellent short-term results have been reported.

It is important to continue to develop new concepts and techniques of biologic bonding of prosthesis to bone. Cement has certainly been effective, but osteolysis is of significant concern. Microinterlock shows promise in the short term. What long-term problems it will engender are yet to be seen.

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Orthopedic and Soft Tissue Applications of Magnetic Resonance Imaging

MAGNETIC RESONANCE IMAGING (MRI) is a relatively new noninvasive diagnostic technique that uses magnetic fields and radio-frequency signals to generate cross-sectional representations of internal anatomy. Advantages of the technique include the absence of a known biologic hazard, direct multiplanar imaging capability without sacrifice of spatial resolution and the ability to provide excellent discrimination among various normal and pathologic soft tissue structures. MRI has been shown to provide useful diagnostic insight into various orthopedic disorders, particularly those affecting muscles, tendons, ligaments, articular cartilage and bone marrow.

The method shows greater sensitivity than skeletal scintigraphy in the early diagnosis of ischemic necrosis involving the femoral head and has shown promising preliminary results in the evaluation of this disease at other sites. Owing to its extreme sensitivity for pathologic processes that begin in bone marrow, MRI can also contribute to the early diagnosis of acute hematogenous osteomyelitis, metastatic disease to the skeleton and myeloproliferative disorders. In the staging of primary osseous neoplasms, the technique is superior to computed tomography (CT) in determining the degree of marrow involvement and soft tissue extension, although cortical bone destruction and matrix calcification or ossification are slightly less well depicted.

MRI has contrast discriminating capabilities that offer advantages over CT, particularly in establishing the precise extent of primary soft tissue pathology, including infection and neoplastic disease. In cases of severe trauma, especially those involving the knee joint, the method can reliably diagnose meniscal damage, cruciate and collateral ligament tears, articular cartilage pathology and intra-articular effusion. MRI may eventually replace arthrography and CT in the evaluation of internal derangements affecting the temporomandibular